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EDITORIAL NOTES

THE LINE OF LEAST RESISTANCE IN EDUCATION

The meaning of the term "line of least resistance" as applied to school work seems to be somewhat confused. Many seem to interpret it as equivalent to the lazy man's doctrine of *laissez faire*; thereby reading into it the idea that Johnnie should not be compelled to do anything which his whim does not prompt him to do, but must work only as his teacher is able to catch and to hold his interest. Conversely, "line of greatest resistance" is understood to mean the course by which Johnnie's nose is held firmly to the grindstone and in which he is made to do what he does not want to do; because grandpa was brought up that way, and because in his future career he will always have to do many things that he does not want to do; and, finally, because it is good for Johnnie to get used to this sort of thing—he needs discipline; and, they assume, discipline must be imposed from without rather than from within.

This dispute over the question of whether, in matters educational, we shall follow the line of least resistance or not, arises from a confusion of the terms license and freedom, and from a failure to comprehend the correct meaning of the term "line of least resistance." Hence it is a mere battle of words, and will be settled as soon as the terms are properly defined.

The term "line of least resistance" is borrowed from physical sciences; and, therefore, for its definition we must turn to science. In the realm of natural phenomena, resistance is the source of useless work; and it is, therefore, the chief obstacle in the way of constructing a perfect machine—a *perpetuum mobile*, as it is often called. Were it not for resistances of various kinds, it would be

**Popular
Misconceptions**

**Scientific
Meaning of
the Phrase**

possible to build a machine that would convert all the energy supplied to it into useful work. Such a machine would be a perfect machine, i. e., its efficiency would be 100 per cent.

But since resistance is inherent in all transformations of energy from one form into another—as from coal into steam power or electric light—and since economy demands that as little of the energy available for a given machine be spent in useless work, it is clear that, in order to convert the greatest possible amount of the available energy into useful work, the machine or system must be so constructed that the resistances inherent in the situation are as small as is possible—taking into account, of course, the limitations and constraints necessary to the conditions of the problem. Hence, in physics, to follow the line of least resistance means to construct machines or other physical systems which shall have the maximum efficiency that is possible under the limitations imposed by the nature of the case.

Line of least resistance is thus equivalent to line of maximum efficiency.

In the light of this definition, the scene of the controversy is shifted; for everyone of us has been trying his best to make his school or his teaching attain maximum efficiency.

**Application to
Education**

So we must all agree that we have been trying to follow the line of least resistance in this sense, which is the true sense. This definition does not, however, settle the problems of education by any means; for we have now to determine how we may find the line of maximum efficiency in any given case.

Before attempting to answer this question, let me point out that this statement of the problem of education renders wholly irrelevant the arguments of those who would run the schools on the good old lines on which they were run when Adam was an urchin. It is as far beside the mark to claim that because the classics and the doctrine of formal discipline have been tried and seem to have proved useful in educating us, they therefore furnish the sole means of attaining maximum efficiency, as for an engineer to claim that because certain devices invented by

Watt had been tried and seemed to prove useful in his engines—which burned twelve pounds of coal per horsepower per hour—they therefore furnish the sole means of attaining maximum efficiency in the modern engine, which burns but one pound of coal per horsepower per hour.

The problem of definitely finding the path of maximum efficiency in the schools is at present rather indeterminate. In the case of the engine, or any other physical system, we are generally in a position to say definitely what the path of maximum efficiency is in the light of our present knowledge; in most cases, we can, and we actually do, foretell how an engine or an electric-light plant shall be constructed and managed in order to attain this end. We are able to do this as well as we do because we have developed an accurate system of measuring both the efficiency of the finished plant, and the properties of the various factors that enter into its construction. In the case of the schools, this is not so. We possess no system of accurate measurement for determining either the educational efficiency of a school plant, or that of a single teacher; nor have we found out how to tell whether a given pupil is developing his maximum efficiency in the social system.

Hence, before we shall be in a position definitely to answer the question as to what is the path of maximum efficiency of a school system or a teacher, some system of measurement will have to be devised, and the laws that relate the properties of the parts of the system to one another—for example the laws relating the individual to society—will have to be worked out. This means much experimentation and many failures, just as has been and still is, to some extent, the case in the domain of engineering. But if the problem is attacked in a truly scientific way—and no one will deny that it is being so attacked now all along the line—there is every reason to believe that the efficiency of the schools will gradually increase, even as that of steam engines is continually doing. But without such study and experimentation, and without an eye constantly on the future, rather than on the past, such progress will be slow indeed.

**Educational
Problems
Indefinite**

**How to Make
the Problem
Definite**

It must now be clear that *license* plays no part in determining the line of maximum efficiency, while *freedom* does. In constructing an electric light plant, for instance, it is never a question of whether the copper will or will not conduct electricity. Since we know some of the laws relating copper and electricity, we are able to place the copper so that it will realize its own nature most completely in serving the plant. If we but knew the laws of the relations of the individual to society, and those of the development of the mind, and a few others of like nature, we would be able to treat Johnnie as we treat the copper; i. e., we could place him in the system so that he would always be in freedom to realize himself in the service of society—for true freedom consists in coming into harmony with law.

C. R. M.

In making the rounds as an art teacher of a public-school system, it once fell to the lot of the writer to spend a weekly half-hour at a small country school. On one occasion an illustrative drawing was in progress. A small boy with more initiative than the rest put a fence in his picture, whereupon the good country schoolmarm pounced upon it with the reproof, "Why Johnny, Miss C. did not tell you to draw a fence! Never do anything that the teacher doesn't tell you to do!" One sometimes feels a suspicion that we as a teaching profession are waiting to be "told" before we really do anything in the matter of industrial education. Looking over the files of educational journals and reports of educational meetings we find that during the last ten years they have been filled with discussions of the subject. One reaches the stage of fairly loathing its mention, and so far to what has it all amounted? In meetings—a long confession of faith—in schools—joints and Morris chairs. And now the public has taken it up and is beginning to demand as President Roosevelt expressed it, "The schools train toward and not away from the farm and the shop." When one reads the opinions expressed at the recent meeting of the Department of Superintendence of the N. E. A., he becomes hope-

ful that something will be done. When he stops to think what it means to alter or introduce one simple exercise in a school machinery as large as that of Chicago or New York he knows that the school man will hesitate before he multiplies any possible mistake by the child population of a metropolis. Consequently the chances are that the manufacturer will act while the educator still hesitates, and so the movement will lack that breadth which would result from their combined efforts.

In our school system great social by-products go to waste. In the cities we realize the value of the country life affording natural stimuli. We long to build a school house in the middle of a farm, feeling that the whole problem would be solved if the curriculum were built around such ideally real conditions. But do the rural schools make use of this material? In towns and cities schools are next-door neighbors, perhaps, of great manufacturing industries or it may be they overlook the comings and goings of a world's commerce. What could be more desirable than that the school system should connect with these natural centers of community life, making use thereby of a fund of experience which under other methods is altogether wasted. Is this done? The trouble is that we spend our time making out uniform courses of study. We see its absurdity when we find that we have taught the Philipinos to make Swedish models—flour sacks, and bread boards. It is just as bad, if not so evident, when we fit the school in Ruralville with the same garment that we cut for the community at Fall River.

But we are quite right in proceeding with caution. The manufacturer never turns his entire plant into an experimental laboratory. Every progressive one does, however, maintain a small shop in which he tries new ideas and when they prove fit and ready for the market he adopts them in his business. Why should not the government treat education in the same business-like and scientific way? It maintains experimental stations in connection with its fisheries. It spends money in developing agriculture. It considers it worth while to send out free seeds

**Utilization of
Social
By-Products
in the School**

**The Duty of the
Government to
Organize
Educational
Laboratories**

to farmers all over the country in order that it may study the needs and possibilities of various soils. Are educational interests of less account? Why should not the Department of Education at Washington equip and carry on a school in some typical rural community, making there a scientific investigation of the best methods of developing the resources and of making up deficiencies? Such a school should be small and should have for its purpose the working out of the proper rural school curriculum. A similar experiment should be maintained in industrial and commercial centers. An educational laboratory is the only economical and scientific way to study the present situation. Let us hope that this national interest in the question will find an outlet in some such sane and immediate results.

L. S. C.